BITING MIDGES REARED FROM LARVAL HABITATS CONTAINING *CULICOIDES VARIIPENNIS* (DIPTERA: CERATOPOGONIDAE) IN NEW ENGLAND[1]

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ABSTRACT: During a survey conducted in New England for larval *Culicoides variipennis*, the larvae of several other species of Ceratopogonidae were found occupying the same habitats. The collections of *Dasyhela mutabilis, C. travisi* and *Bezzia nobilis* represent first records of association of these species with *C. variipennis*.

Culicoides variipennis (Coquillett) has been described as a species complex of from two to five subspecies (Wirth and Jones 1957; Atchley 1967; Downes 1978). While *C. variipennis* s.l. has been implicated as the principal vector of a number of pathogens of vertebrates, most notably the bluetongue (Price and hardy 1954) and episootic hemorrhagic disease viruses (Jones *et al.* 1977) of ruminants, and of *Onchocerca cervicalis*, a filarid parasite of horses (Collins and Jones 1978), it is probable that only one or two of the ssp. are important vectors of these pathogens. For instance, the distribution of bluetongue virus transmission in the U.S. (Metcalf *et al.* 1981; Pearson *et al.* 1992) corresponds to the range proposed for only one of the ssp., *C. v. sonorensis* Wirth and Jones (Walton *et al.* 1992; Tabachnick and Holbrook 1993).

As part of a long-term study to elucidate the *C. variipennis* complex, a survey was conducted in the six new England States in 1992 (FRH, unpublished). Larvae (and sometimes pupae) typical of the Ceratopogonidae were identified in mud contaminated with animal feces in waste water sites on dairy farms. Mud samples containing larvae were shipped to the laboratory in Laramie, WY, and the larvae were held in rearing media as previously described (Jones *et al.* 1969). Upon emergence, adults of species other than *C. variipennis* s.l. were preserved in 70% ethanol and subsequently cleared in phenol-alcohol and mounted on microscope slides in phenol-balsam (Wirth and Marston 1968). Identifications of these *Culicoides* were made using the wing atlas of Wirth *et al.* (1985), the keys and illustrations in Blanton and Wirth (1979), and by comparison with specimens in the synoptic collection of WLG. Voucher specimens are deposited in the collection at the Arthropod-borne Animal Dis-

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eases Research Laboratory (ABADRL), Laramie, Wyoming, with duplicates retained by WLG.

Subfamily Dasyheleinae

Dasyhelea mutabilis (Coquillett)

NEW HAMPSHIRE:Belknap Co., New Hampton, 20-VII-1992, 1♀
VERMONT: Chittenden Co., Richmond, 5-VIII-1992, Farr, 1♀

Comments.– This is a common widespread Nearctic species which has been reared by B. Brookman from Poso Creek and Bakersfield, Kern County, California (Wirth 1952), by R. Jones from the sandy margin of a stream in Rusk County, Wisconsin, and by H. Jamnback and W. Wirth from salt marshes on Long Island, New York (Waugh and Wirth 1976).

This is apparently the first record of this species being reared in association with *C. variipennis*. Since larvae of *Dasyhela* do not actively swim like those of *Culicoides,* but crawl slowly on or in their substrate (Mullen and Hribar 1988), they may not have been in direct competition with the larvae of *C. variipennis.* Furthermore, the larvae of *C. variipennis* are often found on the surface of the mud, particularly when feeding at night (Vaughan and Turner, 1989). However, Hribar and Mullen (1991) reported that larvae of *Dasyhelea* sp. collected from algae, rotting vegetation and treeholes and *C. variipennis* collected from soil near horse and cow manure and sewage lagoons in Alabama both contained diatoms, fungal hyphae and oligochaete setae in their guts.

Subfamily Ceratopogoninae
Tribe Culicoidini

Culicoides crepuscularis Malloch

CONNECTICUT: Litchfield Co., Sharon, 29-IV-1992, 5 ♂♂. MAINE: Aroostook Co., Island Falls, 15-IX-1992, 5 ♂♂, 1♀; Oxford Co., Bethel, 2-IX-1992, 6 ♂♂, 8♀♀; South Paris, 2-IX-1992, 16 ♂♂, 14 ♀♀, Penobscot Co., Kenduskeag, 10-IX-1992, 22 ♂♂, 23 ♀♀; Washington Co., Cherryfield, 24-IX-1992, 42 ♂♂, 31 ♀♀. MASSACHUSETTS: Worcester Co., Berlin, 4-VI-1992, 2 ♀♀. NEW HAMPSHIRE: Belknap Co., New Hampton, 20-VII-1992, 7 ♂♂, 2 ♀♀; Cheshire Co., Walpole, 30-VI-1992, 5 ♂♂, 2 ♀♀; Coos Co., Milan, 1-IX-1992, 18 ♂♂, 9 ♀♀. VERMONT: Addison Co., Middlebury, 4-VIII-1992, 1 ♂; Caledonia Co., Groton, 29-VII-1992, 3 ♂♂, 2 ♀♀; Sheffield, 11-VIII-1992, 6 ♂♂, 4 ♀♀; Chittenden Co., Richmond, 5-VIII-1992, 1 ♂; Franklin Co., Sheldon, 17-VIII-1992, Stebbins, 8 ♂♂, 6 ♀♀; Orleans Co., Troy, 8-VIII-1992, Jacobs, 2 ♀♀; Washington Co., Berlin, 12-VII-1992, Burke, 1 ♂, 1 ♀; Windham Co., Rockingham, 16-VI-1992, Stickney, 7 ♂♂, 6 ♀♀.

Comments.–This common and widespread Nearctic species breeds in a variety of wet habitats and was also found in association with C. variipennis in Texas in household septic effluent by Jones (1959). Blanton and Wirth

(1979) summarized the known breeding sites from which this species has been reared ad follows: pond margins, puddles at stock tank overflows, septic tank overflows, fresh and salt marshes, rainfilled roadside ditches, seepage areas, cattle hoofprints in marshy meadows, lagoon margins, marshy drainage ditches, sewage lagoon effluent, edges of temporary and permanent ponds, edges of hog ponds, and freshwater stream margins.

***Culicoides haematopotus* Malloch**

VERMONT: Washington Co., Berlin, 12-VIII-1992, Burke, 1 ♀.

Comments.–This common and widespread Nearctic species breeds in a variety of freshwater habitats summarized in Blanton and Wirth (1979) and Mullen and Hribar (1988). Interestingly, although Wirth and Bottimer (1956) reared this species in association with *C. variipennis* in Texas, they never reared it from sitres where pollution was extensive.

***Culicoides travisis* Vargas**

VERMONT: Windham Co., Rockingham, 16-VI-1992, 1 ♀.

Comments.–This moderately common species occurs in the eastern two-thirds of the United States and extreme southern Ontario and Quebec. It emerges in late spring to early summer and is typically reared from stream and pond margins, usually in woody situations (Blanton and Wirth 1979). This is apparently the first record of this species being reared with *C. variipennis.*

Tribe Palpomyiini

***Bezzia nobilis* (Winnertz)**

MAINE: Aroostook Co., Washburn, 16-IX-1992, 2♀♀; Oakfield, 15-IX-1992, 8 ♂♂, 11 ♀♀; Oxford Co., Bethel, 2-IX-1992, 2 ♂♂. NEW HAMPSHIRE: Belknap Co., New Hampton, 20-VII-1992, 1 ♂. RHODE ISLAND: Washington Co., Hope Valley, 28-V-1992, 1 ♂, 1♀.

Comments.–This is perhaps the most common and wide ranging species of *Bezzia,* found throughout most of the Nearctic, Neotropical and Palearctic regions (Wirth 1983). The larvae are predaceous and occur in a variety of freshwater habitats, most often in association with filamentous algae. To our knowledge, *B. nobilis* has not previously been reported occurring with *C. variipennis,* and we consider it likely that its larvae prey upon that species.

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